specimens which they have noticed, in various branches of the animal kingdom, yet, as a rule, both such collections and the reports upon them are more or less unsatisfactory to professed naturalists; partly because they usually represent mere fragments of the fauna of the regions explored, and partly because inexperienced collectors often pass over the most interesting species, and bring back common and wide-ranging forms of comparatively little interest.

Alpine climbers in particular, as a class, have done so little for zoology in Europe or the Caucasus, that we hardly expected that Mr. Whymper, whose reputation for daring, determination, and endurance, puts him among the most distinguished of Alpine climbers, would now turn his attention to zoology. He has, however, shown the best possible example to his *confrères* by his Great Andean expedition; and has proved that it is possible without in any way neglecting the special objects of his journey, to do most valuable zoological work; and as the higher regions of the Andes have been neglected by professional collectors, who depend more or less on their success for payment of expenses, the proportion of new Coleoptera brought home by him is very great. Owing, no doubt, to the late Mr. Bates's good advice, Mr. Whymper has secured the assistance of many specialists of eminence in describing his collections, and the work is profusely illustrated with wood-cuts of the highest class, better by far than many of the coloured illustrations which often appear in scientific periodicals.

The total number of species collected amounts, according to Mr. Bates, to about one thousand, but the Diptera, Lepidoptera-Heterocera, Hymenoptera (except the ants), and Arachnida have not been described, on account of the difficulty of finding anyone to work them up; and as the birds do not seem to have attracted much of Mr. Whymper's attention, and fishes are almost wanting in the higher mountain streams, the greater part of the book is taken up by descriptions of the Coleoptera by Messrs. Bates, Sharp, Gorham, Olliff, and others. Messrs. Godman and Salvin have written a chapter on the butterflies, but of these very few occur at elevations of 10,000 feet and upwards; and only two Satyridæ, two species of Lycæna, two Pieris, and two Colias, were taken at or above 12,000 feet. This is a strong proof of the poverty of the high Andes in endemic forms, as compared with the high Alps of Europe and Asia, where, notwithstanding the severity of the climate, a large number of species are found at elevations which, when allowance has been made for the latitude, are much higher than these. This may be accounted for to some extent by the weather, which appears to be, in the high Andes of Ecuador, very wet and windy during the whole year. It is farther explained by the late Mr. Bates in the following remarks, taken from the introduction which he has contributed to the volume:—

"It seems to me a fair deduction from the facts here set forth that no distinct traces of a migration during the lifetime of existing species, from north to south or *vice versâ*, along the Andes have as yet been discovered, or are now likely to be discovered. It does not follow, however, that the Darwinian explanation of the peculiar distribution of species and genera on mountains in the tropical and temperate zones, and in high latitudes of the Old World, is an erroneous one. The different state of things in the New World is probably due to the existence of some obstacle to free migration, as far as regards insects, between north and south, both during and since the Glacial epoch. The problem, like most others relating to geographical distribution, is a complicated one; but there are one or two considerations, likely to be overlooked, which may tend to its solution. One is the great altitude at which the vigorous denizens of the teeming tropical lowlands flourish on the slopes of the Andes. Mr. Whymper found, for example, species of many of the genera of Longicorn Coleoptera characteristic of the lowland forests at altitudes of 9000 and 10,000 feet, and Kirsch has recorded numerous species of *Lampyridæ*, *Lycidæ*, and other families belonging equally to tropical American forest genera, as met with by Reiss and Stübel in Colombia and Ecuador at 12,000 feet. In Ecuador all the warm moisture brought by the eastern trade-winds is not intercepted even now by the wall of the Andes, and wherever that falls, in the depressions, conditions of climate and vegetation will be created suitable to these encroaching tropical forms. If we add to this the barrenness and generally unfavourable conditions of the zone above those altitudes, there can be little wonder that temperate forms have not freely passed along the Andes. Another consideration is that there may have been a breach of continuity of the land in Glacial times, at the Isthmus of Panama, sufficient to prevent free migration. It may, further, be legitimate to speculate on the possibility of the Andes being lower in the tropical zone during the Glacial epoch. A few hundred feet lower than the present altitude, combined with the copious warm rains which must have accompanied the age of ice, would present conditions undoubtedly favourable to the spread of tropical forms over the whole area which would successfully resist the invasion of high northern or southern species. The main principle in distribution, however, is that forms sooner or later, and in proportion to their intrinsic and extrinsic facilities of dissemination, will find their way all over the world to wherever the conditions inorganic and organic are favourable to their acquiring a footing. That these facilities are possessed in a higher degree by plants than insects and some other groups of animals may be a sufficient explanation of the fact that so many species of plants have surmounted the obstacles to their passage from north to south during the last Glacial epoch, while few or no insects have done so. The more distant, or generic, relationship between the insects of Chili and those of the north temperate zone can only be explained on the assumption of a migration at some epoch far more remote than the last Glacial epoch."

Mr. Whymper's book as a whole is a remarkable example of his talent as an explorer, a mountain climber, and an accurate observer both of physical, geographical, and natural history phenomena, and though we have waited eleven years for its appearance, nothing has been lost and much has been gained by this delay, and his book will take rank among the very best works of scientific travel which have ever been written.

H. J. Elwes.

THE HISTORY OF EPIDEMICS.

A History of Epidemics in Great Britain from A.D. 664 *to the Extinction of Plague.* By Charles Creighton, M.A., M.D. (Cambridge: University Press, 1891.)

THE task undertaken by Dr. Charles Creighton in writing a history of epidemics in Britain from 664 (the year of the first pestilence recorded by an authority that can be regarded as contemporary) to the

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extinction of plague is one of enormous difficulty. The materials for such a history must be sought for high and low; chance allusions in private letters or municipal records will supply links in the chain of evidence for which the writings of the medical authorities of the time may be searched in vain, if indeed there be any medical authorities; and Dr. Creighton found that for his purposes "medical books proper are hardly available . . . until the end of the Elizabethan period, . . . and do not begin to be really important . . . until shortly before the date at which" his present labours end. When such evidence as can be found has been found and sifted, there still remains the most intricate problem of all—that of tracing the epidemics recorded to their origin, accounting for their spread, and in some cases explaining why a country should in modern times be spared diseases which scourged it in the Middle Ages.

No better illustration of these difficulties could be found than is supplied by chapter ii., "Leprosy in Mediæval Britain." The first point that Dr. Creighton has to make clear is that all the so-called lepers were not really lepers. In extreme cases the word "leprosus" may have been used simply as meaning "beggar or common tramp"; elsewhere it may have been applied to victims of syphilis, lupus, and so forth. For the sufferers special provision was no doubt made, on a scale due in part to a morbid or mistaken religious sentiment; but examination of the charters and other documents relating to these charities suggests that, of the supposed foundations for lepers, some were merely refuges for sick and infirm poor, in others provision was made for three or four times as many non-leprous as leprous inmates, while from others, towards the end of the thirteenth century, the lepers were disappearing or getting displaced. Finally, the author concludes that the prevalence of true leprosy at any time in England was probably not so great as in the worst provinces of India at the present day; but, however justifiable scepticism as to its supposed ravages may be, that the disease really did prevail can hardly be doubted, and the reasons for doubt are lessened, if a *vera causa* for its presence can be found. Such a *vera causa*, compatible with its subsequent disappearance, may be discovered, not in "importation," *e.g.* by Crusaders—a suggestion Dr. Creighton does not consider worth thinking about—but in the staple diet of the times, a semi-putrid or toxic character of animal food combining with other depressing influences to give rise to leprosy, just as a similar character of bread or porridge gives rise to pellagra.

We have given the arguments of this chapter somewhat in detail, because the criticism which obviously applies to them, applies elsewhere. Considering the uncertainty which surrounds the facts, it is clear that the traditions of the leprosy of the past cannot very materially assist, though they may be explained by, the study of modern leprosy. Similarly, in the case of the plague, to which naturally Dr. Creighton devotes much of his book, to say nothing of that old question, the value of the evidence of the Bills of Mortality, the inquirer is met at once by the great difficulty of knowing when "the plague" which is spoken of as invading out-of-the-way places really was the genuine plague—a point of vital importance, as soon as any etiological questions are raised, and we may here observe that Dr. Creighton writes:—

"In concluding the career of the sweat in England, we may pass from it with the remark that it did not cease until other forms of pestilential fever were ready to take its place. The same explanation remains to be given of the total disappearance of the plague from England after 1666: it was superseded by pestilential contagious fever, a disease which was its congener, and had been establishing itself more and more steadily from year to year as the conditions of living in the towns were passing more and more from the mediæval type to the modern."

It would be impossible here to enter into the merits or the reverse of all Dr. Creighton's explanations of the facts he records. In the chapter on small-pox, which is likely to be the one first consulted, we find a passage which disarms criticism: "It has been the fate of small-pox as an epidemiological subject to be invested with bigotry and intolerance." Yellow fever has as yet hardly sunk to that deplorable level; and as Dr. Creighton's theory appears to be that "the dysenteric matters of the negroes" carried on the slave ships "had themselves in turn bred an infection of yellow fever for the whites," it may be asked whether the alleged protection of Africans of pure blood from the infection of yellow fever "in all circumstances ashore or afloat, . . . not by acclimatization but by some strange privilege of their race," is either supported by all recent authorities, or not capable of the explanation that in infancy they may pass through some disease too slight to be recognized as yellow fever, but which serves to confer immunity.

The general impression left upon the mind by this history is that it would have been a wise policy to make two books instead of one out of the materials collected—in one simply to bring together such facts as Dr. Creighton's industry has gleaned from the authorities, and in the other to enter upon the questions of etiology, which are bound to give rise to interminable discussion.

Besides those we have mentioned, gaol fevers, influenzas, "the French pox," and scurvy in early voyages, are the principal diseases treated of in this volume. In dealing with influenza Dr. Creighton draws attention to the relation in point of time between the outbreaks in the latter half of the sixteenth century and great epidemics of plague, and a somewhat similar relation between fever and influenza and exceptional climatic conditions in the years 1657-59.

OUR BOOK SHELF.

Mineralogy. By Frederick H. Hatch, Ph.D., F.G.S., of the Geological Survey of England and Wales. (London: Whittaker and Co., 1892.)

DR. HATCH has followed up the publication of his excellent "Introduction to the Study of Petrology," recently noticed in these pages, by a little book on mineralogy, which will, we think, be of equal service to students. He has recognized the fact that for one person who desires to enter upon a systematic study of mineralogy, regarded as a natural-history science, there are twenty who need only such an amount of mineralogical information as will enable them to profitably commence the study of geology. We think, therefore, that the prominent place given to the felspars, the pyroxenes, the amphiboles, the micas, and similar common rock-forming species in this work, is fully justified; and not less so the unsystematic but convenient grouping of other minerals as "ores and veinstones," "salts and other useful minerals," and "gems or precious stones." De Lap-

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